

Faraday Rotation at the 2p-edges of Fe, Co and Ni

H.-Ch. Mertins, F. Schäfers, A. Gaupp, W. Gudat

BESSY GmbH, Albert-Einstein-Strasse 15, D-12489 Berlin

We report on resonantly enhanced magneto-optical Faraday rotation of linearly polarised soft X-rays across the 2p absorption edges of magnetised Fe, Co and Ni transmission samples. Rotation values were measured which are more than one order of magnitude larger than experimentally observed so far /1/. By means of linear polarisation analysis the dependence of Faraday rotation on layer thickness, angle of incidence, magnetic field strength and photon-energy was performed. The data have been obtained with tuneable, linearly polarised synchrotron radiation at the PM 3 beamline at the Berlin storage ring BESSY I using the soft X-ray polarimeter /2/ which was equipped with electromagnetic coils for in situ magnetisation of samples. From the rotation data the magnetic circular dichroism (MCD) of the dispersion part of the refraction index n was determined directly, showing strong resonances at the 2p edge. The circular dichroism of the absorption part of n was determined by the analysis of the circular polarisation, induced by the transmission process, as well as by MCD transmission spectra of the same sample. Both measurements are in good agreement. Thus Faraday measurements provide an experimental pathway to obtain element-specific information on the circular dichroism of magnetic materials even with linearly polarised light.

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